Table 1.4.1a Occupational exposure data of glyphosate

Industry, country, year	Job/process	Results	Comments/additional data	Reference
Forestry/ Canada, 1986	Signaller	Mean: Morning 0.63 µg/m^3; Afternoon 2.25 µg/m^3	Air concentrations of glyphosate were measured at the work sites during ground spraying. 350 urine samples were taken, glyphosate level was under quantification limit in all of them.	Centre de Toxicologie du Québec (1988)
	Operator	Mean: Morning 1.43 µg/m^3; Afternoon 6.49 µg/m^3		
	Overseer	Mean: Morning 0.84 µg/m^3; Afternoon 2.41 µg/m^3		
	Mixer	Mean: Morning 5.15 µg/m^3; Afternoon 5.48 µg/m^3		
Finland/NR	Forestry workers/ Silvicultural clearing work	The highest concentration of glyphosate in air was 15.7 µg/m^3	The clearing work is done with brush saws equipped with pressurized herbicide sprayers. Samples were taken from the workers' breathing zone. Urine samples were collected during the afternoons of the workweek. Glyphosate's urine concentrations were under the detection level (0.1 ng/microL)	Jauhiainen *et al.* (1991)
USA/NR	Tree nurseries	Only 1 of 78 dislodgeable residue samples were positive for glyphosate. The body portions receiving the highest exposure were ankles and thighs..	Dermal exposure was assessed with gauze patches attached to the clothing and hand rinsing. Urine analysis did not reveal any positive samples	Lavy *et al.* (1992)
USA/NR	48 farmers, their spouses, and 79 children	The percentage of samples with detectable levels of glyphosate peaked the application day: 60% of farmers' samples, 4% of spouses samples and 12% of children samples. Concentration in all samples ranged: Farmers: ND to 233 ppb Spouses: < 1 to 3 ppb Children: < 1 to 29	24-hour composite urine samples for each family member the day before, the day of, and for 3 days after a glyphosate application.	Acquavella *et al.* (2004)
UK	18 municipal weed controllers	Median 16 mg/m^3 in 85% of 21 personal samples for workers spraying with mechanized all-terrain vehicle Median 0.12 mg/m^3 in 33% of 12 personal samples collected from workers with backpack with lance applications	Also dermal exposure was measured, but not reported as glyphosate, but as spraying fluid	Johnson *et al.* (2005)

GM, geometric mean; ND, nondetectable; NR, data not reported

Table 1.4.1b Concentrations of glyphosate in water

Country, year of sampling	Number of samples/Setting	Results	Comments/additional data	Reference
USA/2002	51 streams/Agricultural areas 154 samples	Glyphosate was detected in 55 samples (36 percent) Mean: 0.54, 0.12 and < 0.1 µg/L in each season Maximum: 5.1 µg/L AMPA was detected in 107 samples (69 percent). Mean: 0.17, 0.06 and < 0.1 µg/L in each season Maximum 3.67 µg/L	The samples were taken during –pre-emergence -post-emergence -harvest season	Battaglin *et al.*, (2005)
Canada/2002	NR/ Agricultural	Glyphosate was detected in most of the wetlands and streams Maximum 6.079 µg/L of glyphosate.	The highest level was detected in St. Mary's River Irrigation District	Humphries *et al.* (2005)
Denmark/1999–2012	NR/Agricultural	The maximum concentrations of glyphosate registered in water drainage in two sites were found in 2009 (31 ug/L and 4.7 mg/L respectively).	The glyphosate was detected in the depth of the drainage system and not on the groundwater	Brüch *et al.* (2013)
USA/2002	10 wastewater treatment plants and two reference streams	Maximum concentrations of glyphosate and AMPA were 2 and 4 µg/L respectively.	AMPA was detected much more frequently (67.5%) compared to glyphosate (17.5%).	Kolpin *et al.* (2006)
Colombia/		No detections of glyphosate or AMPA that exceeded 0.1 µg/L (detection limit)		Solomon *et al.*, 2007

NR, data not reported

* Partial results of this monitoring program have been reported previously by other authors.

Table 1.4.1c Concentration of glyphosate in food

Country, year	Type of food	Results	Comments/additional data	Reference
Denmark/NR	Cereals	> 50% samples with residues The means were 0.08 mg/kg in 1999 and 0.11 mg/kg in 1998	49 samples harvest 1998 46 samples of the 1999 harvest	Granby &Vahl, (2001)
27 European Union Member States, Norway and Iceland/NR	350 different food commodities	9.54% of cereals samples 0.04% of fruits and vegetables samples	74 305 samples analysed 409 cereals samples (39 had detectable levels of glyphosate) 2302 fruits and vegetables samples with	EFSA (2009)
Australia/	Cereals, fruits, vegetables, milk products, meat, poultry, fish and sea foods, egg products, sugar, seed and nuts, fat and oils.	75% samples with residues Mean 0.08 mg/kg Range < 0.005 to 0.5 mg/kg	Percentage of glyphosate	McQueen *et al.* (2012)

NR, data not reported

Table 1.4.1d Urine concentrations of glyphosate in the general population

Country/Period	Subjects	Results	Comments/additional data	Reference
USA/2001	25 farm families (24 fathers, 24 mothers and 66 children) 25 non-farm families (23 fathers, 24 mothers and 51 children)	Frequency of glyphosate detection ranged 66 to 88% of samples. Urinary glyphosate concentration ranged 0.02 to 18 µg/L in farm families and 0.06 to 9.4 in non-farm families.	The highest levels were found in fathers and children of farm families (18 µg/L)	Curwin et al. (2007)
Colombia/2005–2006	112 residents of sprayed areas to control illicit crops	39% of samples had detectable levels of glyphosate. Mean 7.6 µg/L, range 0–130 µg/L. 3.8% of samples had detectable levels of AMPA. Mean 1.6 µg/L and range 0–56 µg/L.	Colombian provinces of Huila, Tolima, Putumayo, Guaviare, Santander, Antioquia, Magdalena and La Guajira.	Varona *et al.* (2009)
Canada/NR	30 pregnant women 39 nonpregnant women	Mean: ND in pregnant women and In nonpregnant women: mean 73.6 ng/ml, range ND-93.6 ng/ml ND in maternal and blood cord serum	No subject had worked or lived with a spouse working in contact with pesticides.	Aris &Leblanc. (2011)
18 European countries	NR	44% of samples with quantifiable levels of glyphosate and 36% AMPA. Maximum: Glyphosate: 1.8 µg/L AMPA: 2.6 µg/L	8–12 participants of each country. 182 urine samples	MLHB (2013)

GM, geometric mean; AM, arithmetic mean; ND, nondetectable; NR, data not reported